Overview of Beam Experiments Run5

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Beam Ex: motivation, goals

GOALS

- Improve machine **performance** (longer time scale than 'now' machine performance) Class1
- **Luminosity, upgrade** (RHIC-II) Class 1.5?
- Development of beam **diagnostics techniques**
- Inter-lab **collaborations**
- Class 2 (nothing happened so far)

Coming Year

- Start of experimental activities towards RHIC upgrades
- Limited start of **Class-2** experiments

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Beam Experiment Categories

Class:

0: likely to immediately benefit RHIC machine performance, or crucial to RHIC hardware decision-making

1: directly benefiting RHIC machine performance

2: benefiting general accelerator community

Priority:

A: a) benefiting RHIC operation; b) well prepared; and c) likely to succeed

B: has at least two of the above three

C: has at least one of the above three

D: none of the above

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Beam Experiment Statistics - Run 03

period	Planned (h)	Scheduled (h)	Beam available (h)
first 5 weeks	60	36	24
d-Au run (10 weeks)	120	100	65
pp run	36	26	20
total run 2003	156	126	85

Scheduled/planned	~80 %
Beam/planned	~55 %
Beam/scheduled	~65%

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Beam Experiment Statistics - Run 04

period	Planned (h)	Scheduled (h)	Beam available* (h)
Au-Au run (13 weeks)	156	141	119
pp development	*0*	*12 (last shift)*	

Scheduled/planned	Au	~90 %
Beam/planned	Au	~76 %
Beam/scheduled	Au	~84%

*Ignored beam interruptions < ½ hour
Overestimates availability

Impact of other programs (pp setup, NSRL)
Beam/scheduled during NSRL setup: 65%
Beam/scheduled last 3 beam-ex sessions: 80%

Overall improvement of beam experiments productivity from last year – reflecting overall increase of machine performance/reliability and people experience/creativity

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Highlights of Beam Ex. in Run 04

- IR corrections (across IR, sextupole, octupole)
- Tune scans (store, injection) → working point
- AC dipole, optics measurements (coupling in progress)
- Pressure rise → confirm NEG pipes, solenoids
- Beta* squeeze → beta*=85-90cm in Phenix, Star
- *Decoupling via skew modulation*
- Pressure rise, measure of desorption coefficients
- Dynamic aperture, blue and yellow, Au,pp, in and off collision
- IBS measurements, gaussian and hollow beam
- Transverse echo
- Measurement and partial correction of non-linear chromaticity
- …….

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Beam Ex. List for 2004

Exp. No.	Key words	Spokesperson
03-01	Optics test with b*=0.5 m (pp at 100 GeV)	Pilat
03-04	Intrabeam scattering	Fischer
03-05	Transverse echos	Fischer
03-06	Q` measurement via RF phase modulation and PLL	Bruning, Tepikian
03-09	Pressure rise in AtR	Fischer
03-12	Suppression of synchrotron radiation	Burkhardt, Pilat
03-16	Beam polarization profile measurement	Huang
03-23	Nonlinear resonances	Ptitsyn
03-27	Dynamic aperture at flattop	Pilat
03-29	Head-tail Q' measurement	Cameron, Jones
03-30	Beam-beam emittance growth vs. transverse offset	Fischer
03-31	Beam-beam, long bunches & large X-ing angle	Fischer
03-33	Beam-beam resonance driving terms	Fischer
03-38	Optics test with b*=20 m (pp at 100 GeV)	Tepikian, Guryn
03-40	Interaction Region Correction	Pilat
04-01	Measure of multipole strengths from BPM data	Tomas
04-02	Skew chromaticity	Tepikian
04-03	Beam based prediction of snapback	Bottura, Pilat
04-04	Schottky chromaticity	Cameron
04-05	PLL/Schottky coupling measurement	Cameron
04-06	Non-linear tune spread	Cameron
04-07	Chromaticity feedback	Cameron
04-08	Instabilities in RHIC/impedance measurement	Blaskiewicz
04-09	Stochastic cooling feasibility study	Blaskiewicz, Brennan
04-10	Measure of coupling via skew quad modulation	Pilat, Luo
04-11	Beta star measurement	Pilat, Wittmer
04-12	Pressure bump vs.pumping speed	Thieberger
04-13	Tune scans at injection	Tomas
04-14	Beam scraping and pressure rise	Huang
04-15	Solenoid effect on RHIC electron cloud	Smart
04-16	Nonlinear chromaticity	Tepikian Ptitsyn
04-17	Transition pressure rise vs. bunch pattern	Iriso
04-18	Electron cloud characteristics	Iriso
04-19	Linear optics measurement and correction	Bai
04-20	Coupling measurement with AC dipole	Bai
04-21	Vacuum chracteristics of PR and NEG pipes	He
04-22	Central frequency measurement	Cameron
04-23	Gas desorption from SS under perp. beam impact	Fischer
04-24	Coherent and incoherent EC tune shifts	Luo, Cameron
04-25	Tune Feedback	Cameron

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Beam Ex Program for 2005

Analysis of 2004 data

- Use the AEAC worksheet on the WEB to collect **results from studies** – link to written documents or published papers. To all experiment spokespersons: please check the web-page and send me your publications (peered journals, tech notes)with links to the websites.
- The updated list of **written analysis** will be a **factor** in experiment evaluation and scheduling next run

Program

- Program will be worked out during the **summer** and **fall**, and decided ~2 weeks before physics run starts. Another meeting is likely before pp physics run starts.
- More involvement from Operators- a few operators have been identified to work for the studies and some of them already started working on beam ex.

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Beam Ex Program: Run 2005

Decoupling on the ramp	Y. Luo
AC dipole (coupling)	M. Bai
Pressure rise, e-cloud (NEG, new limits)	S.Y.Zhang
Stochastic cooling	M. Blaskiewicz
Nonlinear (tune spread, IRs)	V. Ptitsyn
Beta* squeeze and measurement	F. Pilat
Higher order IR corrections	F. Pilat/Y. Luo/N. Malitsky
Beam-beam	Tomas/Fischer/Malitsky
Polarization	H. Huang/M. Bai
PLL experiments	P.Cameron
Schottky	K. Vetter
IBS	Wei/Fedotov
Cryo Jitter	C. Montag
RHIC II	V. Litvinenko (?)
eRHIC	V. Ptitsyn

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New Beam Experiments in 2005

Many experiments will be carried over from run4.

Possible new experiments:

1. Anti-grazing rings to study effect on beam loss induced desorption and aperture limitation(P. Thieberger, SY).
2. Jet optical signals to study the jet cleanness and beam property (N. Luciano, Dejan)
3. Stochastic cooling (Mike)
4. eRHIC related beam experiments (Christoph).
5. Electron cooling related experiments (Ilan).
6. Polarization related experiments (Mei. Haixin)
7. LHC related experiments(Angelika).

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Beam Ex: Polarized Proton Period

First time to have a "long(?)" polarized proton physics run.
Pressure rise and beam-beam will continue in pp run.

Examples of polarization related studies:

- >200GeV polarized proton acceleration (lump several experiment sessions together)
- Spin tune measurement
- Polarimeter systematic error study
- Spin flipper
- …..

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Beam Ex 2005- Scheduling

Assuming that the weekly scheduling process from Run 2004 is retained:

- Scheduling Meeting — Monday
- Experiments Meeting — Wednesday
- (beam experiment time) — Wednesday
- Beam Ex Meeting — Friday

Key to the successful beam experiments in 2005:

Good preparation for the beam experiments

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